TERN/OzFlux Site Updates and Future Flux Projects

OzFlux Meeting
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Methven, NZ

Dr Robert Simpson
Faculty of Agriculture, Food and Natural Resources

THE UNIVERSITY OF SYDNEY

Sub-alpine grassland sites

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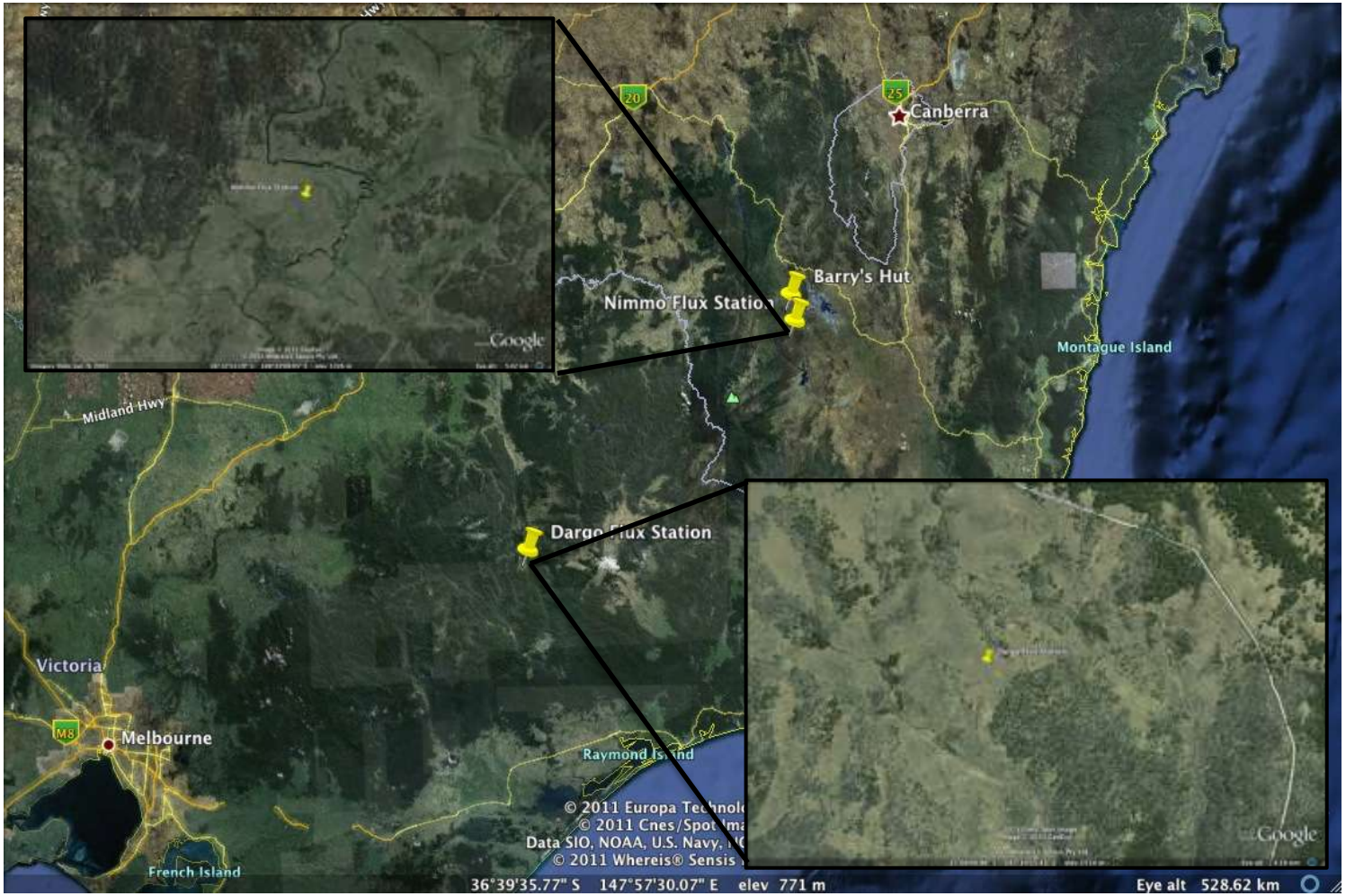


Sub-alpine grassland sites

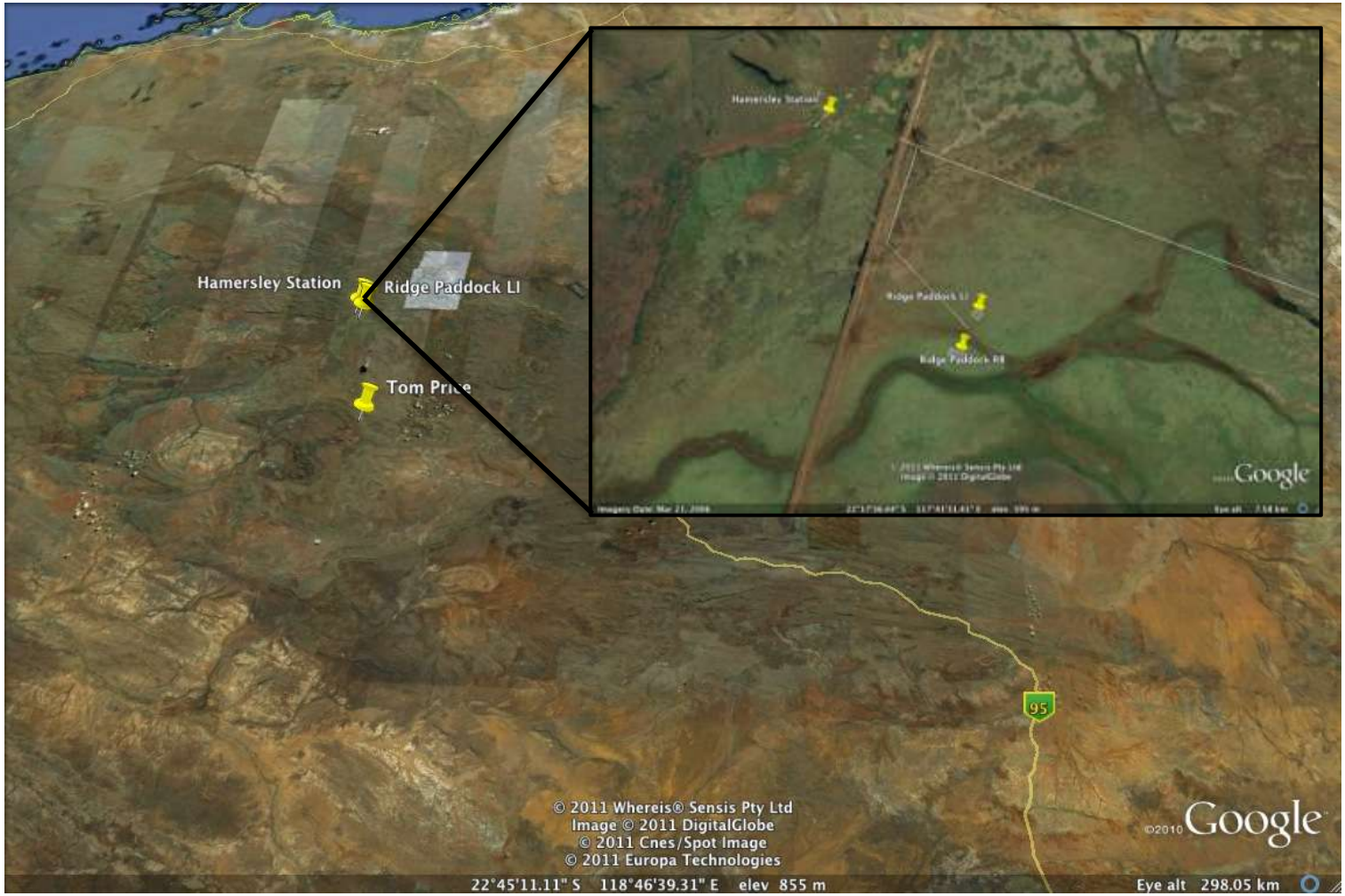
- Both sites operational and logging data
- Sites to remain operational into the future
- Sites continue to utilise LI-7500 open-path configurations

Sub-alpine grassland sites

- Data loss due to open path configuration and inaccessibility of sites over winter
- On-site data backups at both sites failed during the 2011 winter season
- Netbooks replaced with industrial embedded PCs. NextG data modems installed
- Remote data upload and integrated PC control now possible

Pilbara sites

- Significant issues related to the establishment of these sites



Pilbara sites

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- Success!! RTIO agree to new tower design
- Portable, trailer mounted, telescoping mast
- Standard OPEC fitout
- Designed for rapid deployment and removal
- Principle scientific questions still centred around dewatering (+possible water addition…think crop circles!)
- Will travel to multiple mine sites and other areas of interest

Portable Flux Trailer

- Tandem axle trailer (3 tonne capacity)
- Custom built cabinetry to house pneumatics, power supply and instrumentation
- Mast head and ground sensors hard wired into logger. Simple plug and play
- 5 section, pneumatic aluminium mast. Maximum height ~22m. Maximum headload 30kg @ 1m^2; rated to 100 km h^{-1}
- Due for deployment late July, being shipped to Perth for engineering checks next week
- Full induction sets for multiple staff to follow. Will guarantee access to portable mast and Hamersley Station
- Remote communications package deployed with both systems

Further Portable Flux Platforms

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Further Portable Flux Platforms

- Expansion of eddy flux measurements to include CH_4 and possible N_2O
- Aiming to sample various systems however there is a definite agricultural focus (see point above)
- Nothing comes for free…
  - High power demand
  - Leading edge of CRDS technology
  - Issues associated with closed-path systems

Power Issues

- Design brief for portable stations includes:
  - Remote area deployments
  - Relatively long periods between site visits
  - Serve as a platform for expansion/swapping of other scalars as analysers become available (e.g. isofluxes, VOCs?)
- Continuous power demand of >1.5 kW if running both CRDS instruments and associated pumps
- Hybrid power supply
  - Solar
  - Very large battery bank
  - Fuel cell
- H_2 fuel cells excel at energy density, suffer from packaging and consumption rates
- Vice versa for methanol cells

Power Issues

- Relatively new hybrid fuel cell technology offers best of both worlds
- Designed for telecom back up applications
- Utilises methanol-water mix
- Passes fuel through reformer and produces it's own H_2
- Continuous output of 2.5kW @ 48VDC
- Near zero emissions
- Trailer mounted…though not meant to be

Outlook

- By years end we should have 6 operational flux sites
- Remote access into each site enabled and automated data upload to cloud/Sydney for each site
- CO_2, H_2O and CH_4 operational by years end. Possible addition of N_2O by end of 2013

Acknowledgements

- Casey Trust
- Treasure family